internet commerce for manufacturing

A National Testbed for Automating the Manufacture and Electronic Commerce of Printed Circuit Assemblies

Component-Based EC Workshop
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Mission:

" to **assist industry in the development of technology** ... needed to improve product quality, to modernize manufacturing processes, to ensure product reliability ... and to **facilitate rapid commercialization** ... of products based on new scientific discoveries."

NIST Programs	EC-Related Activities
Measurement and Standards Laboratories ▪ Electronics & Electrical Engineering ▪ Chemical Science and Technology ▪ Materials Science and Engineering ▪ Information Technology ▪ Technology Services ▪ Manufacturing Engineering ▪ Physics ▪ Building Fire & Research	♦ Digital Signatures ♦ Encryption ♦ Product Data Exchange Standards ♦ Supply Chain Management ♦ Electronic Component Catalogs ♦ National Advanced Mfg Testbed: – ICM – Framework Project – VITSS
Advanced Technology Program	Focused Program in EC EC-related funded projects
Manufacturing Extension Partnership	National Advanced Mfg Testbed: –ICM –VITSS
Malcolm Baldrige Quality Award	

NIST Advanced Technology Program
EC Activities

http://www.atp.nist.gov/elec-com/ec_off.htm

- White Paper: "Interoperable Infrastructures for Distributed Electronic Commerce", defining the criteria for a candidate ATP Focused Program
- March workshop presentations
- bulletin board for posting comments concerning the white paper.

No decision has been made concerning launching a focused program in this area.

Currently funded projects include:

1. "Component-Based Commerce: The Interoperable Future", Veo Systems (formerly CNgroup), CommerceNet Consortium, BusinessBots, and Tesserae Information Systems.

2. "Business Object Component Specification, Generation and Assembly", Data Access Technologies, Inc.

3. "Certifying Security in Electronic Commerce Components", Reliable Software Technologies, Inc.

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Goals

- Develop and demonstrate the integration of electronic commerce services with technical information interchange, as applied to the electronics assembly process.

Metrics

- Industry adoption, input into related standards and test modules.
- Establishment of testbed and research agenda, involving industry participants.
- Dissemination of testbed results to small and medium-sized manufactures via the NIST Manufacturing Extension Partnership.

Benefits

- Lower industry risk in evaluating and adopting electronic commerce-oriented technologies and practices.

Project Structure

Collaborators:

- Georgia Tech: State-of-the-Art Assembly line; research
- Automata Design Inc: Manufacturability Service Bureau
- IPC, Digital, HP, IGI, OrCAD, GenRad, Solectron: GenCAM development, testing & demonstration
- ECCE: activity modeling, CAM-F development & demonstration, architecture
- DARPA, NSF, OMG, Veo Systems, CommerceNet: architecture

Principal Investigators:

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1998 Milestones

• Held NIST Peer Review Workshop	(4Q97)
• Held ICM Scenario Workshop	(4Q97)
• Held ICM Strategy/Scenario Workshop	(1Q98)
• Demonstrated GenCAM Test Module	(1-2Q98)
• Contributed to Publication of GenCAM Specification	(1-4Q98)
• Publish Standards Roadmap	(3Q98)
• Publish Activity Model	(3Q98)
• Publish Business Case	(3Q98)
• Hold Architecture Workshop	(3Q98)

Printed Circuit Assembly Trends

- Information exchange is paper-intensive, relying on outdated or incomplete standards that are often manually adjusted.
  - One major EMS spends an entire day with each customer to extract the data they need.

  ⇒Inadequate information exchange cuts into extremely thin EMS margins (typically 3%).

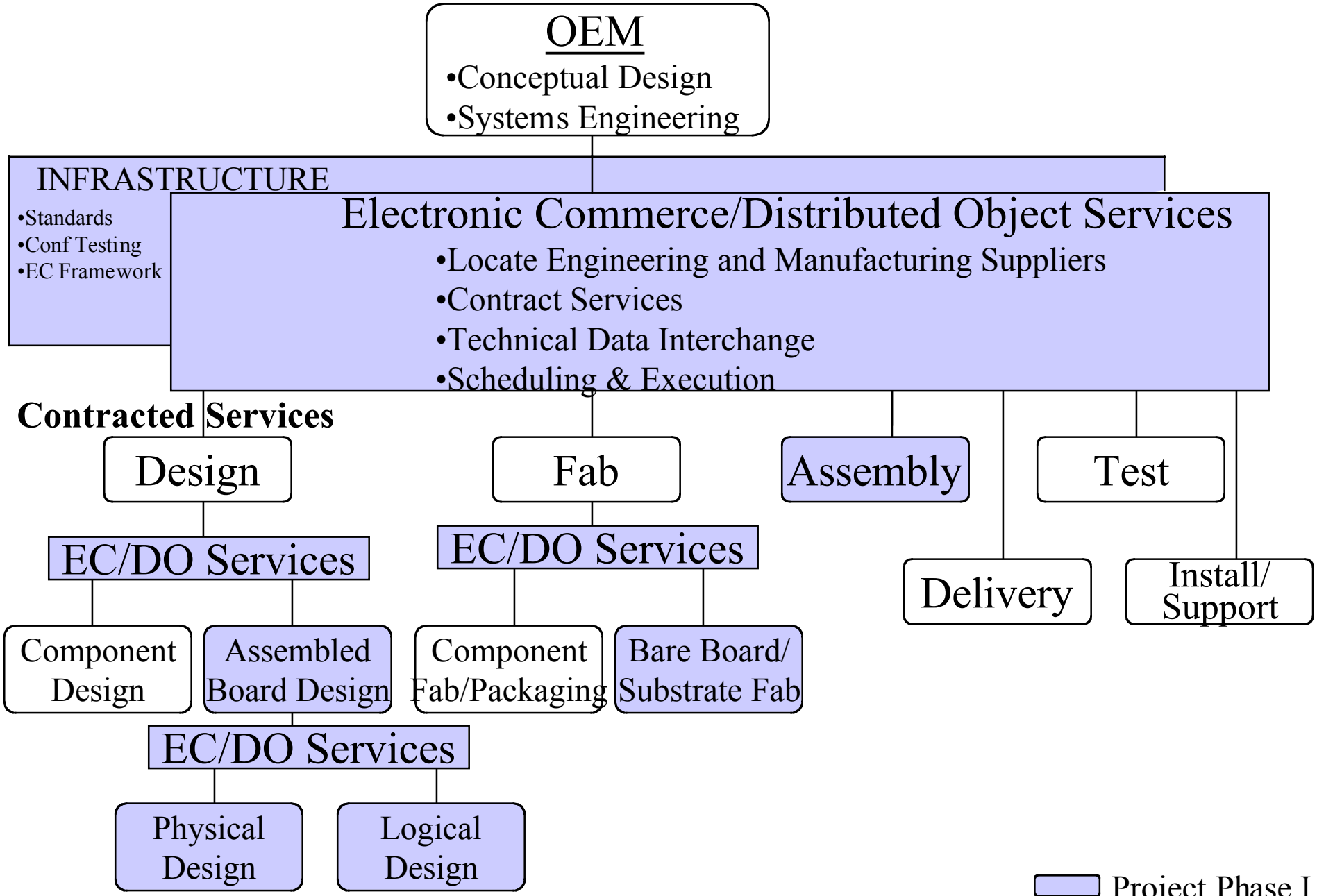
- Manufacturers guess on 80% of customer requirements:
  - <20% of new customers provide complete data
  - <60% of existing customers provide complete data
  - 0% of customers provide data that requires no modifications
  - Designs are getting too sophisticated for CAM tools to reverse engineer.

  ⇒Manufacturers are forced to trade-off time-to-market for cost in outsourcing decisions.

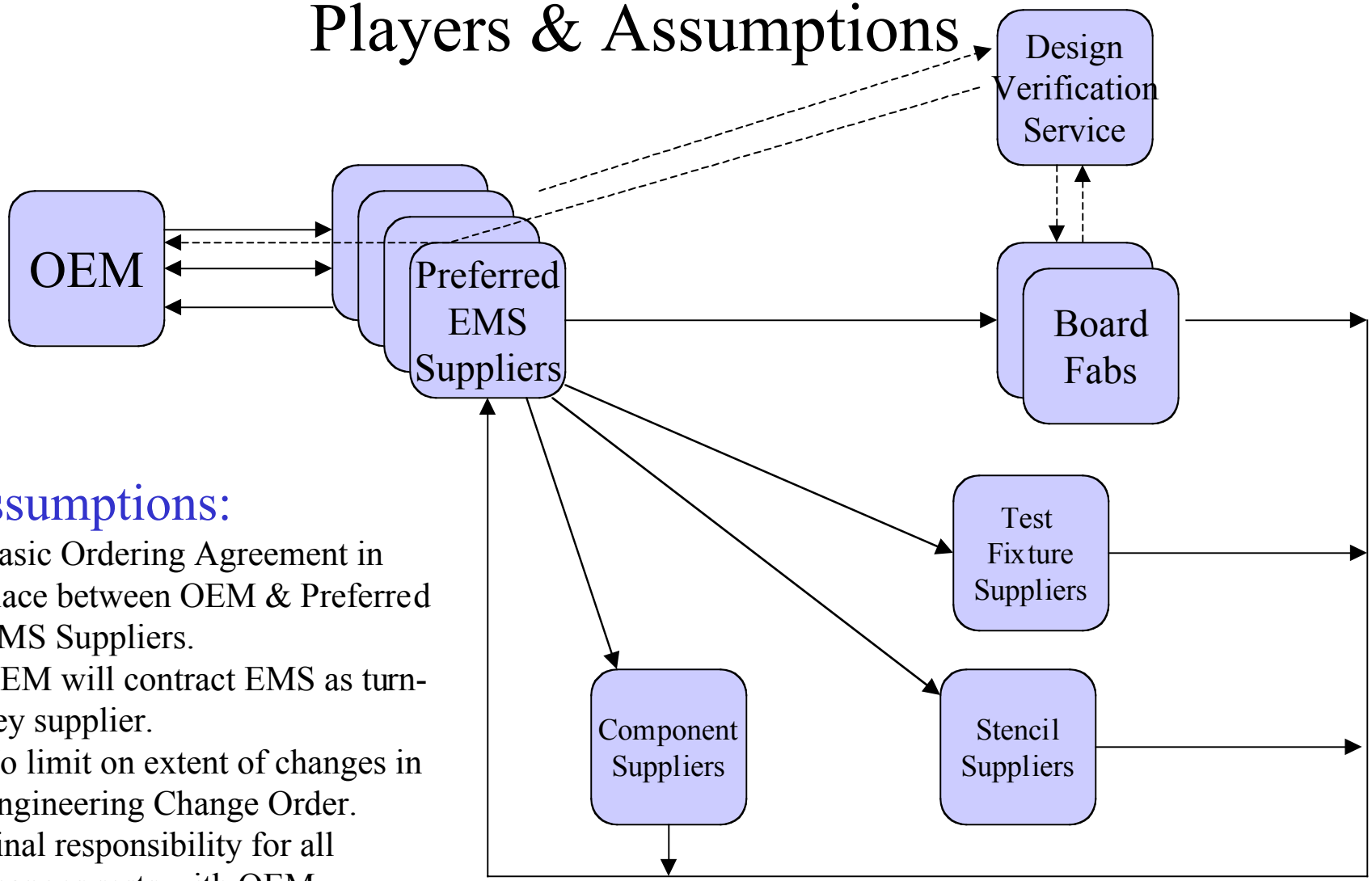
- OEM's are pushing more responsibility onto subcontractors and contract manufacturers.

  ⇒Manufacturing relies on complex, distributed supply web.

ICM PILOT SCOPE



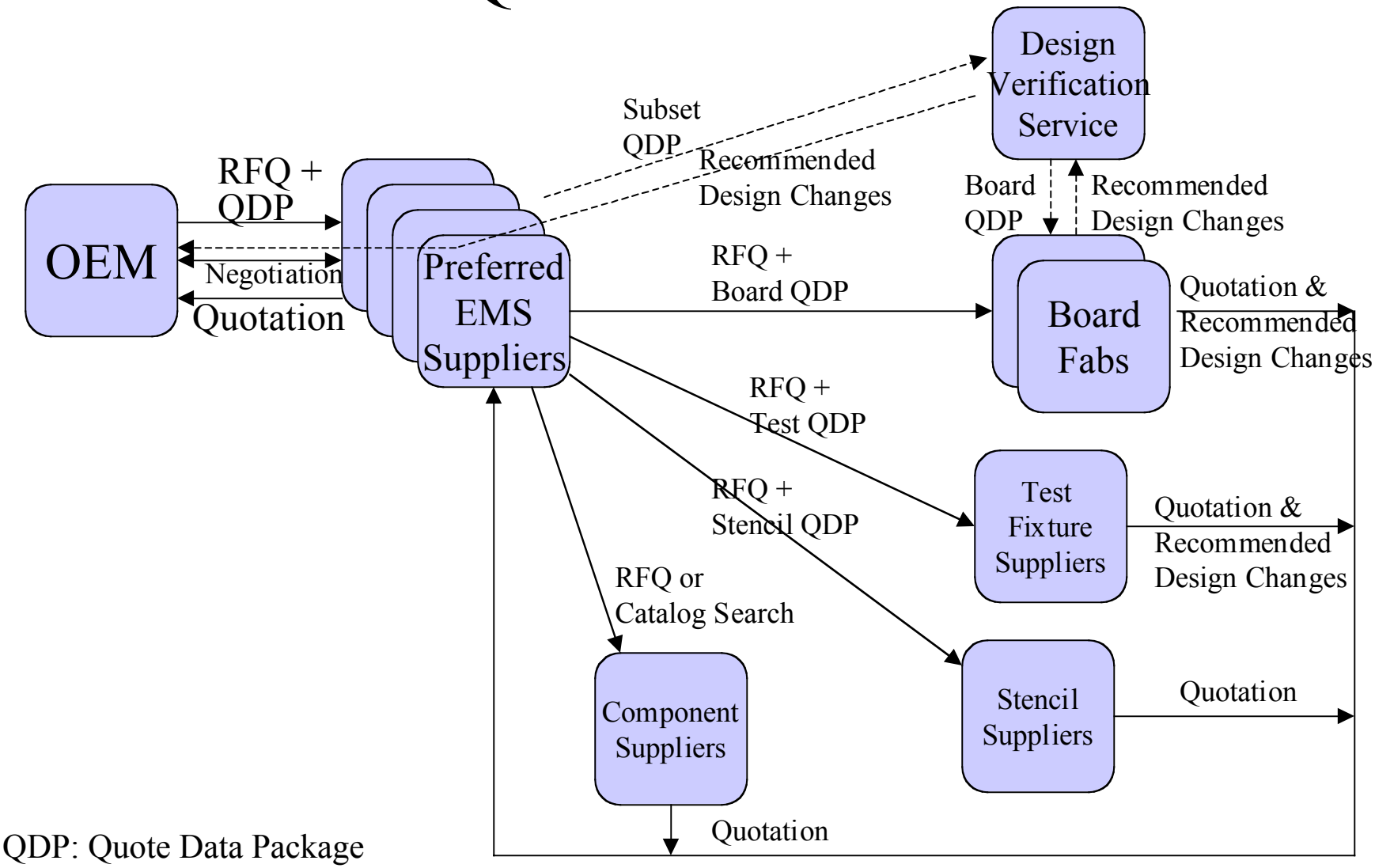
Printed Circuit Assembly Supply Chain Testbed: Players & Assumptions



Assumptions:

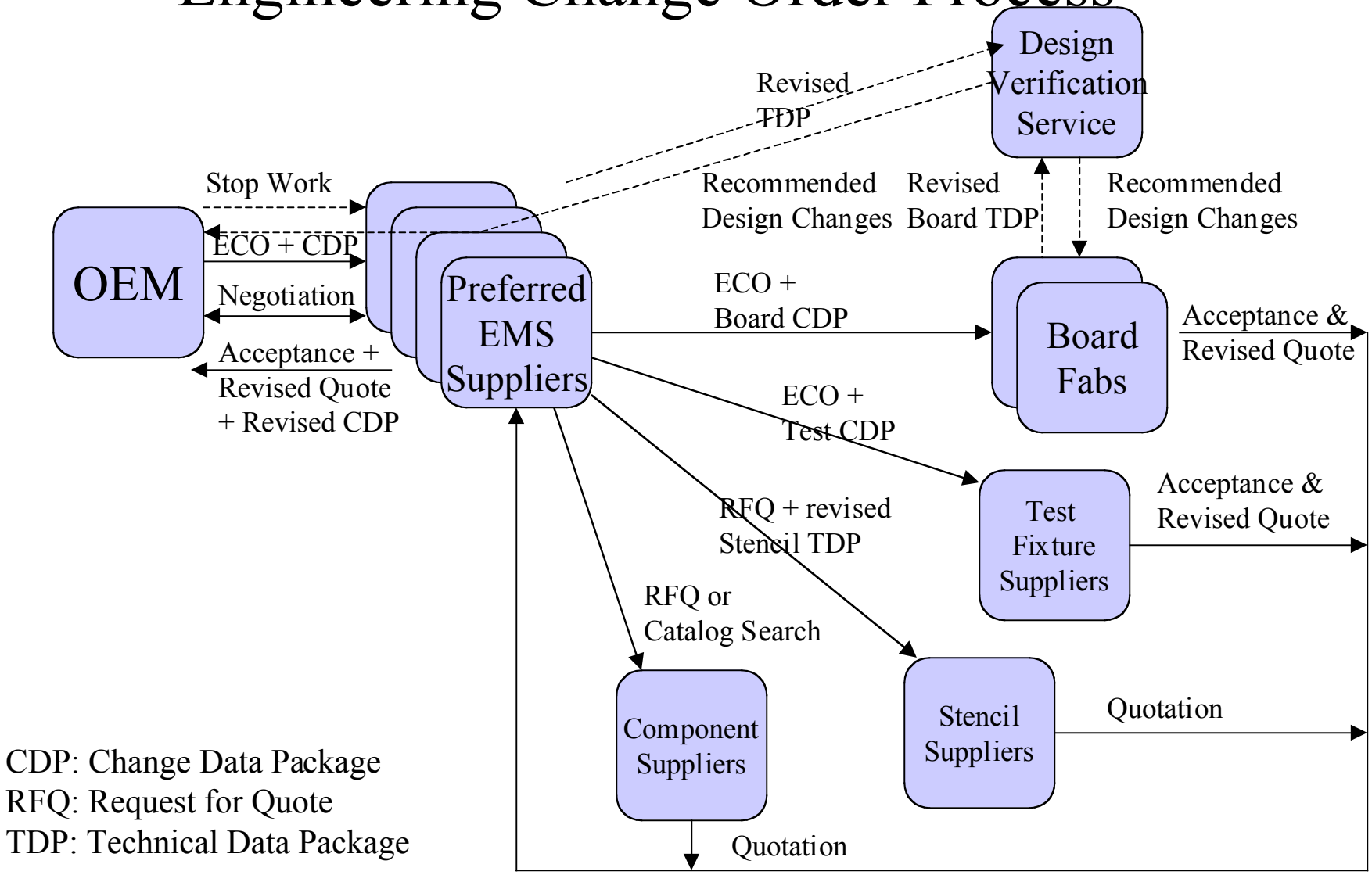
- Basic Ordering Agreement in place between OEM & Preferred EMS Suppliers.
- OEM will contract EMS as turn-key supplier.
- No limit on extent of changes in Engineering Change Order.
- Final responsibility for all changes rests with OEM.

Printed Circuit Assembly Supply Chain Testbed: Quote Process



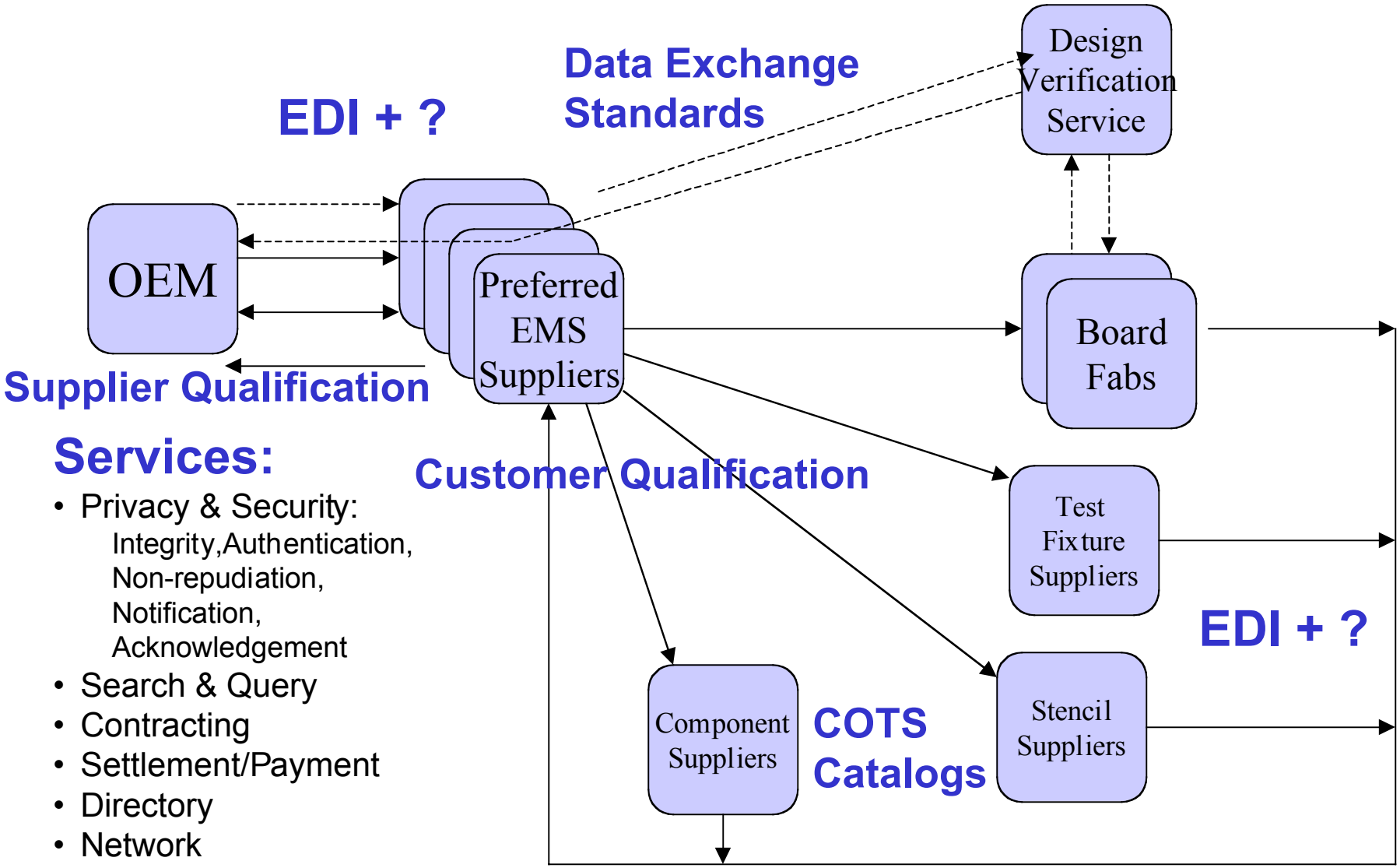
QDP: Quote Data Package
RFQ: Request for Quote

Printed Circuit Assembly Supply Chain Testbed: Engineering Change Order Process



CDP: Change Data Package
RFQ: Request for Quote
TDP: Technical Data Package

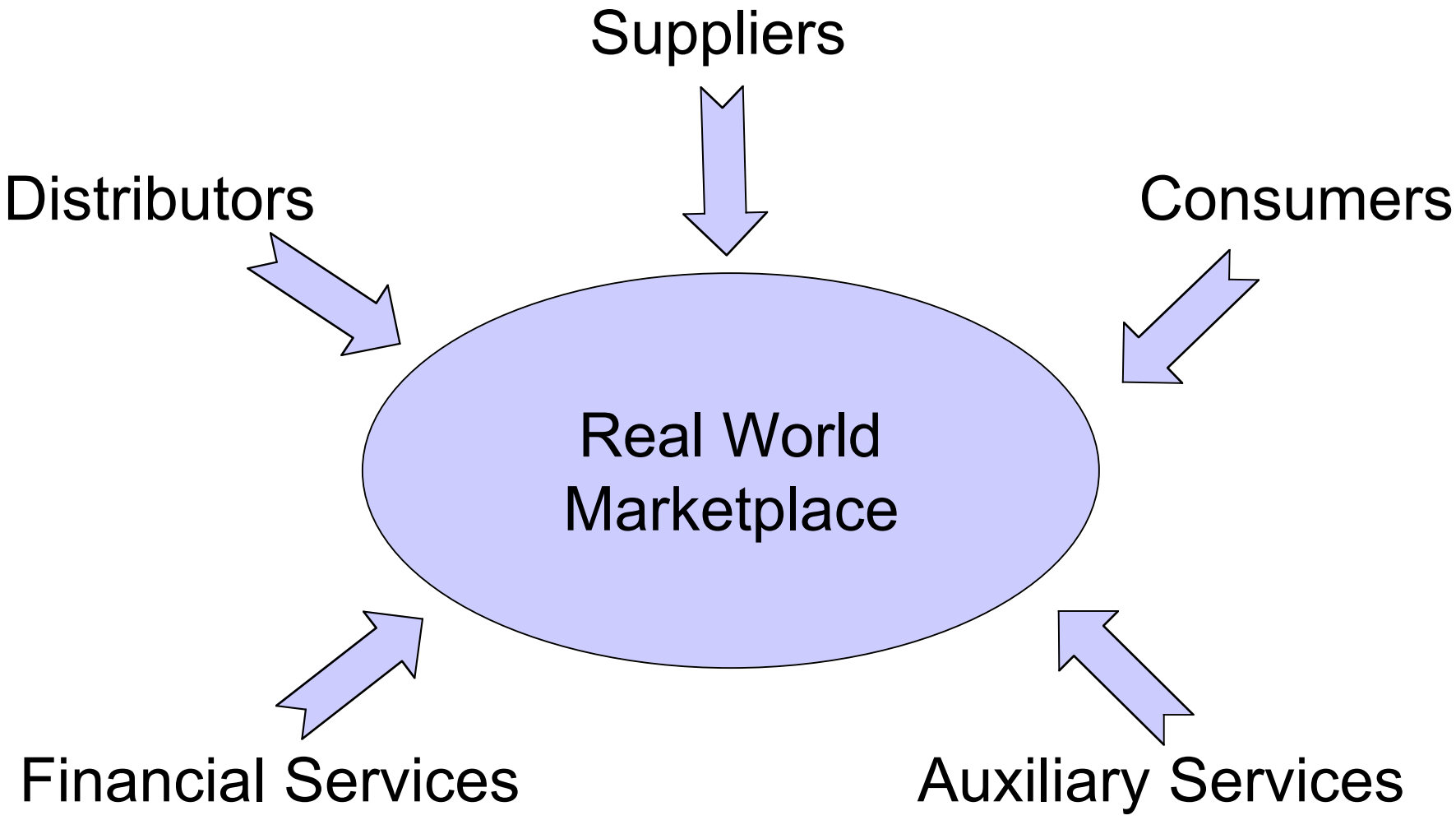
Printed Circuit Assembly Supply Chain Testbed: Standards & Services



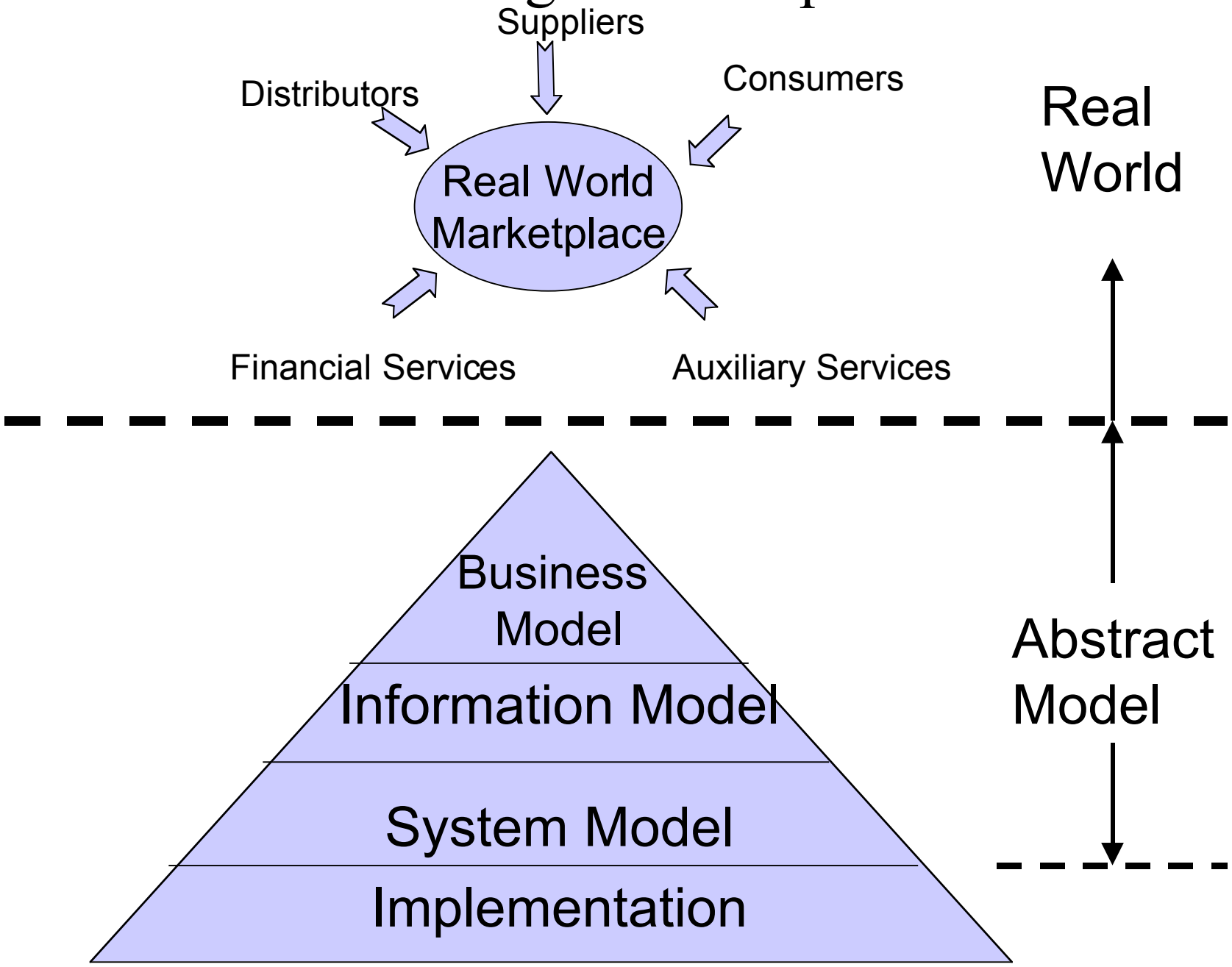
Services:

- Privacy & Security:
  Integrity,Authentication,
  Non-repudiation,
  Notification,
  Acknowledgement
- Search & Query
- Contracting
- Settlement/Payment
- Directory
- Network
- Catalogs
- Qualification

Players in Commercial Enterprises



Architecting the Enterprise



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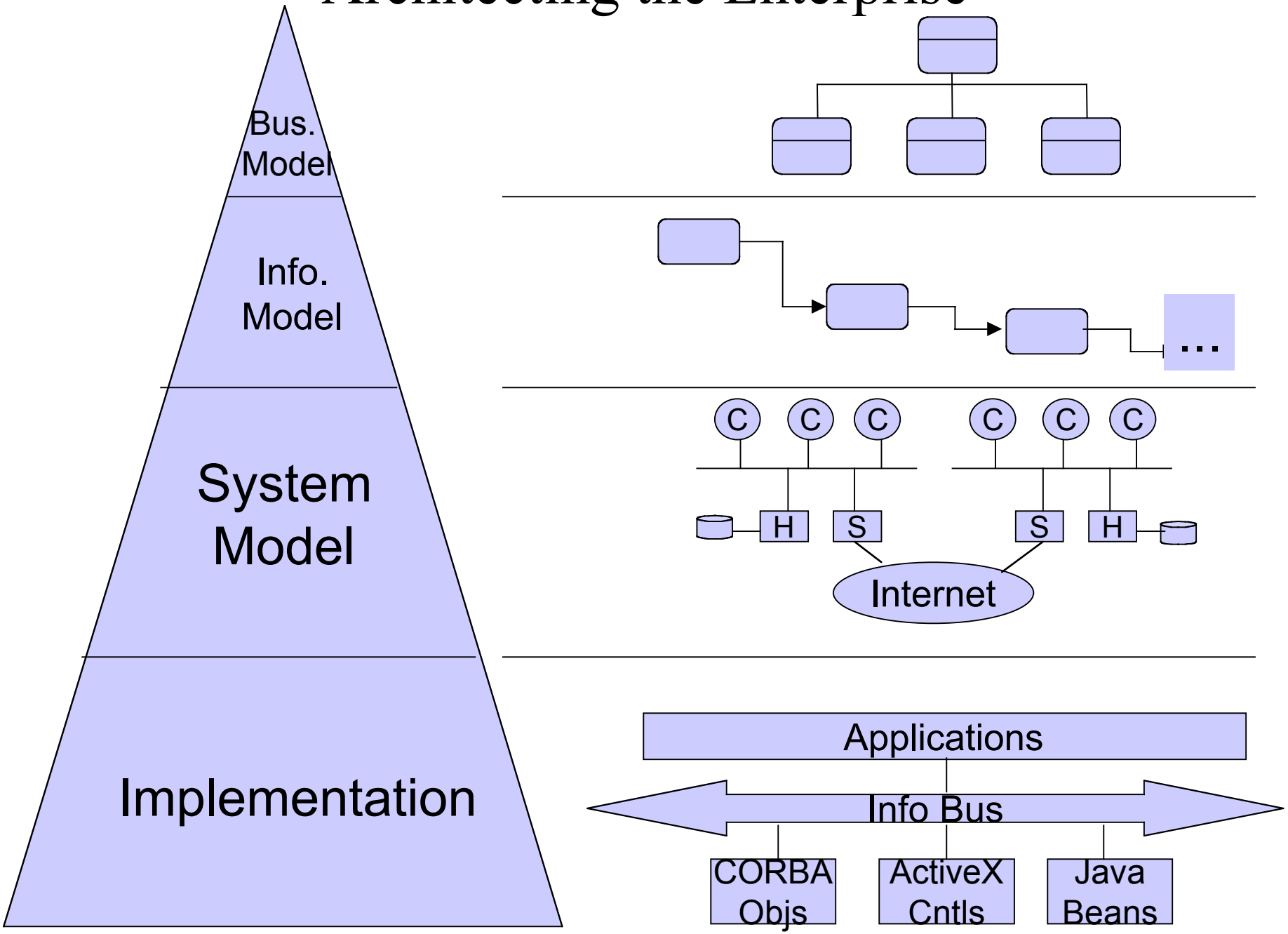

Architectural Concerns

Primary NIST research interest is in the Data Exchange Standards area:

- content and form of exchanges, effect on “negotiation”
- software tools supporting the standards
- ability to extract/convert TDP to “subset TDP” for second tier suppliers
- ability to use TDP directly in developing quotations and in manufacturing processes

EDI

- EIDX provides information content requirements and options for EMS RFQ, Quotation
- EDI/XML or Open EDI for actual exchanges
- EDI does not cover all the interchanges: suggested design changes and negotiations

Product Catalog services

- Future item in the program, expected to use EC services and EIA standards

Payment services

- ICM will adopt current state of the art

Security services

- Concern is association of EC services with scenario interchanges

Objectives of Evening Session: "Component-Based Architecture for NIST ICM Project"

- Review C-B Architectures and Core EC Services for ICM Project
- Establish ICM Architecture Advisory Board
- Review ICM Standards Roadmap